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10/581,737	08/11/2006	Masahiko Yoshimoto	KIM-009	8662

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EXAMINER	
KIM, HEE-YONG	
ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/581,737	YOSHIMOTO ET AL.	
	Examiner	Art Unit	
	HEE-YONG KIM	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,8-11,14-19 and 21-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8-11,14-19 and 21-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 June 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. **Claims 7, 12-13, 20, and 25-26** are cancelled in the preliminary amendment.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. **Claims 1-6, 8-11, 14-19, and 21-24** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding **claims 1-6, 8-11, 14-19, and 21-24**, claims recite "encoding/decoding" which can be interpreted as either "encoding and decoding" or "encoding or decoding". Therefore, it is indefinite. For the prosecution of the application, examiner interprets it as "encoding or decoding".

Regarding **claim 9,** it recites "…the second means of avoiding failure situation at least with a means of invalidating blocks for interrupting the process of encoding with the means of encoding motion picture at a prescribed timing and, when a macro block which has escaped the encoding is detected, effecting a block invalidating process on the macro block".

However, it is not clear about "invalidating blocks". For the prosecution of the application, examiner interprets it as "signaling not to encode blocks". Also it is not clear about "a macro block which has escaped the encoding". For the prosecution of the

application, examiner interprets it as skipped macroblock (no encoded bits are necessary).

Regarding **claims 10-11 and 23-24,** they recite "residual operation volume" or "residue of the volume operation". However, they are not clearly defined or well understood. For the prosecution of the application, examiner interprets it as the remaining operation volume.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 1-5**, and **8, 10-11, 14-18, 21, 23-24** are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi (Proceedings of 2002 IEEE international Conference on Computer-Aided Design, pp.732-737) in view of Miyazaki (US 2001/0,048,319), hereafter referenced as Choi and Miyazaki respectively.

Regarding **claim 1**, Choi discloses Frame-Based Dynamic Voltage and Frequency Scaling for a MPEG Decoder. Specifically Choi discloses A motion picture decoding system (MPEG decoding, pp.732, second col., line 3) incorporating a means of decoding motion picture for sequentially decoding a motion picture in the unit of frame (frame, pp.734, first col., line 1-3) formed of a plurality of

successive frames by the use of a processor (StrongArm-1110, pp.732, second col., 4th paragraph) implemented with MOS transistors (CMOS VLSI, pp.732, first col., Introduction) laminated on a semiconductor substrate and

enabling the processor to control an operating frequency and a supply voltage (DVFS (Dynamic Voltage and Frequency Scaling), pp.732, Introduction),

which system is characterized by comprising a means of calculating necessary operation volume for calculating the volume of operation necessary for decoding the present frame (frame based workload calculation, pp.733-735)

and a means of deciding supply voltage and operating frequency (Calculating clock speed and voltage, pp.736, first col.) for deciding an operating frequency capable of decoding the volume of necessary operation within a time allocated (frame interval) in advance to the process for decoding the present frame and permitting the processor to operate steadily in the unit of frame with the operating frequency (supports 12 different frequencies, pp.736, second col, line 6) decided by the means of deciding operating frequency while causing the means of decoding motion picture to perform the process of decoding the present frame.

However, Choi fails to disclose A motion picture encoding system with the above same features, and deciding substrate bias voltage suitable for the operating frequency and permitting the processor to operate steadily in the unit of frame with the substrate bias voltage decided by the means of deciding substrate bias voltage-operating frequency.

In the analogous field of endeavor, Miyazaki discloses Semiconductor Integrated Circuit. Miyazaki specifically discloses deciding substrate bias voltage suitable for the

operating frequency and permitting the processor to operate steadily (determined on the frequency/supply voltage/substrate bias corresponding table, paragraph 66, and Fig.1), in order to suppress power consumption at minimum in the range that the proper speed is met (paragraph 66).

Therefore, given this teaching, it would have been obvious to the ordinary person in the art to modify Choi by providing specifically frequency/supply voltage/substrate bias table and substrate bias voltage control circuit, in the order to suppress power consumption at minimum in the range that the proper speed is met. The Choi Frame-Based Dynamic Voltage and Frequency Scaling for a MPEG Decoder, incorporating the Miyazaki frequency/supply voltage/substrate bias table and substrate bias voltage control circuit, has all the features of claim 1.

Regarding **claim 2**, the Choi Frame-Based Dynamic Voltage and Frequency Scaling for a MPEG Decoder, incorporating the Miyazaki frequency/supply voltage/substrate bias table and substrate bias voltage control circuit, as applied to claim 1, discloses all the features of claim 2.

Regarding **claim 3**, the Choi Frame-Based Dynamic Voltage and Frequency Scaling for a MPEG Decoder, incorporating the Miyazaki frequency/supply voltage/substrate bias table and substrate bias voltage control circuit, as applied to claim 1, discloses A motion picture decoding system according to claim 1, wherein the processor allows the operating frequency thereof to vary in r steps (r denoting an integer of not less than 2) (Choi: supports 12 different frequencies, pp.736, second col, line 6) and the means of deciding substrate bias voltage-frequency calculates the

operating frequency Fe necessary for processing the necessary operation volume Kp with the time Te by the formula Fe = Kp/Te (Pseudo code for DVFS, pp.736, first col., formula for next_freq_FD) using the necessary operation volume Kp (workload) of the present frame calculated by the means of calculating necessary operation volume and the time Te (deadline in the above formula) allocated to the processing of the present frame, selects from the operating frequencies (one among 12 different frequencies) available for the operation of the processor an operating frequency exceeding (should exceed to meet the necessary operation) the necessary operating frequency Fe mentioned above and approximating most closely (in order to suppress power consumption) to the operating frequency Fe, and decides a substrate bias voltage (incorporating the Miyazaki frequency/supply voltage/substrate bias table) suitable for the selected operating frequency.

Regarding **claim 4**, the Choi Frame-Based Dynamic Voltage and Frequency Scaling for a MPEG Decoder, incorporating the Miyazaki frequency/supply voltage/substrate bias table and substrate bias voltage control circuit, as applied to claim 1, discloses A motion picture decoding system according to claim 2, wherein the processor allows the operating frequency thereof to vary in r steps (r denoting an integer of not less than 2) (Choi: supports 12 different frequencies, pp.736, second col, line 6) and the means of deciding substrate bias voltage-frequency calculates the operating frequency Fe necessary for processing the necessary operation volume Kp with the time Te by the formula Fe = Kp/Te (Choi: Pseudo code for DVFS, pp.736, first col., formula for next_freq_FD) using the necessary operation volume Kp (workload) of

the present frame calculated by the means of calculating necessary operation volume and

the time Te (deadline in the above formula) allocated to the processing of the present frame, selects from the operating frequencies (one among 12 different frequencies) available for the operation of the processor an operating frequency exceeding (should exceed to meet the necessary operation) the necessary operating frequency Fe mentioned above and approximating most closely (in order to suppress power consumption) to the operating frequency Fe, and decides a substrate bias voltage (incorporating the Miyazaki frequency/supply voltage/substrate bias table) suitable for the selected operating frequency.

Regarding **claim 5**, the Choi Frame-Based Dynamic Voltage and Frequency Scaling for a MPEG Decoder, incorporating the Miyazaki frequency/supply voltage/substrate bias table and substrate bias voltage control circuit, as applied to claim 1, discloses A motion picture encoding/decoding system, which is provided with a means of avoiding failure situation for avoiding the failure situation (Choi: Fig.4 Under-Predicted) which occurs when the necessary operation volume calculated by the means of calculating necessary operation volume is smaller than the actually necessary volume of operation.

Regarding **claim 8,** the Choi Frame-Based Dynamic Voltage and Frequency Scaling for a MPEG Decoder, incorporating the Miyazaki frequency/supply voltage/substrate bias table and substrate bias voltage control circuit, as applied to claim 1, discloses A motion picture decoding system which is

provided as the means of avoiding failure situation with a second means of avoiding failure situation for judging whether or not the necessary operation volume calculated by the means of calculating necessary operation volume is smaller than the volume of operation actually necessary for the process of encoding/decoding performed by the means of decoding motion picture and, when the calculated volume of operation is judged to be smaller, performing a process for avoiding the failure situation (Choi: Fig.4 Under-Predicted).

Regarding **claim 10,** the Choi Frame-Based Dynamic Voltage and Frequency Scaling for a MPEG Decoder, incorporating the Miyazaki frequency/supply voltage/substrate bias table and substrate bias voltage control circuit, as applied to claim 8, discloses A motion picture decoding system, which is provided as the second means of avoiding failure situation at least with a means of judging residual operation volume interrupting the process of decoding performed by the means of decoding motion picture at a prescribed timing (Choi: Fig.4, under-predicted, pp.734, end of FD and start of FI) and, when the residue of the necessary operation volume of the present frame calculated by the means of calculating necessary operation volume is smaller (Under-Predicted) at the time of the interruption than the residue of the volume of operation actually necessary for the process of decoding the present frame performed by the means of decoding,

increasing the operating frequency (Choi: Fig.4, under-predicted, pp.734, shows increasing the Supply Voltage which implies increasing the operating frequency for FI in

order to finish in deadline,) of the processor, and operating the processor with a substrate bias voltage suitable for the operating frequency.

Regarding **claim 11,** the Choi Frame-Based Dynamic Voltage and Frequency Scaling for a MPEG Decoder, incorporating the Miyazaki frequency/supply voltage/substrate bias table and substrate bias voltage control circuit, as applied to claim 8, discloses A motion picture decoding system, which is provided as the second means of avoiding failure situation at least with a means of judging residual operation volume interrupting the process of decoding performed by the means of decoding motion picture at a prescribed timing (Choi: Fig.4, under-predicted, pp.734, end of FD and start of FI) and, when the residue of the necessary operation volume of the present frame calculated by the means of calculating necessary operation volume is smaller (Under-Predicted) at the time of the interruption than the residue of the volume of operation actually necessary for the process of decoding the present frame performed by the means of decoding,

increasing the operating frequency (Choi: Fig.4, under-predicted, pp.734, shows increasing the Supply Voltage which implies increasing the operating frequency for FI in order to finish in deadline,) of the processor, and operating the processor with a power voltage supply and a substrate bias voltage suitable for the operating frequency.

Regarding **claim 14**, the claimed invention is a method claim corresponding to the system claim 1. Therefore, it is rejected for the same reason as claim 1.

Regarding **claim 15**, the claimed invention is a method claim corresponding to the system claim 2. Therefore, it is rejected for the same reason as claim 2.

Regarding **claim 16**, the claimed invention is a method claim corresponding to the system claim 3. Therefore, it is rejected for the same reason as claim 3.

Regarding **claim 17**, the claimed invention is a method claim corresponding to the system claim 4. Therefore, it is rejected for the same reason as claim 4.

Regarding **claim 18**, the claimed invention is a method claim corresponding to the system claim 5. Therefore, it is rejected for the same reason as claim 5.

Regarding **claim 21**, the claimed invention is a method claim corresponding to the system claim 8. Therefore, it is rejected for the same reason as claim 8.

Regarding **claim 23**, the claimed invention is a method claim corresponding to the system claim 10. Therefore, it is rejected for the same reason as claim 10.

Regarding **claim 24**, the claimed invention is a method claim corresponding to the system claim 11. Therefore, it is rejected for the same reason as claim 11.

6. **Claims 6 and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi in view of Miyazaki, further in view of Megiddo (US 6,571,298), hereafter referenced as Megiddo.

Regarding **claim 6**, the Choi Frame-Based Dynamic Voltage and Frequency Scaling for a MPEG Decoder, incorporating the Miyazaki frequency/supply voltage/substrate bias table and substrate bias voltage control circuit, as applied to claim 5, discloses everything claimed except A motion picture decoding system according to claim 5, which is provided as the means of avoiding failure situation with a first means of avoiding failure situation for enabling the necessary operation volume

calculated by the means of calculating necessary operation volume to be increased by a prescribed value.

In the different field of endeavor, Megiddo discloses System and Method for Grouping Disk Access Commands in a Queue According to Proximate Disk Position. Megiddo specifically discloses adding safe margin to hard disk seek and settling time (analogous to *calculating necessary operation volume to be increased by a prescribed value*), in order to avoid failure in the case of underestimation of seek time.

Therefore, given this teaching, it would have been obvious to the ordinary person in the art to modify Choi and Miyazaki by providing specifically adding safe margin to estimate of operation volume, in order to avoid failure of decoding. The Choi Frame-Based Dynamic Voltage and Frequency Scaling for a MPEG Decoder, incorporating the Miyazaki frequency/supply voltage/substrate bias table and substrate bias voltage control circuit, further incorporating the Megiddo adding safe margin to estimate of operation volume, has all the features o claim 6.

Regarding **claim 19**, the claimed invention is a method claim corresponding to the system claim 6. Therefore, it is rejected for the same reason as claim 6.

7. **Claims 9 and 22** are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi in view of Miyazaki, further in view of Zhao (Signal Processing Image Communication 18 (2003), pp.801-811), hereafter referenced as Zhao.

Regarding **claim 9,** the Choi Frame-Based Dynamic Voltage and Frequency Scaling for a MPEG Decoder, incorporating the Miyazaki frequency/supply voltage/substrate bias table and substrate bias voltage control circuit, as applied to

claim 8, discloses everything claimed except A motion picture encoding system according to claim 8, which is provided as the second means of avoiding failure situation at least with a means of invalidating blocks for interrupting the process of encoding with the means of encoding motion picture at a prescribed timing and, when a macro block which has escaped the encoding is detected, effecting a block invalidating process on the macro block.

In the analogous field of endeavor, Zhao discloses Macroblock Classification for Complexity Management of Video Encoders. Zhao specifically discloses Video Codec predicting skipped macroblocks (*macroblocks which has escaped the encoding*) prior to encoding and then encoding operation (motion estimation and compensation, DCT, quantization) could be avoided (*invalidating blocks*), in order to save computation (pp.802, left col., line 31-40). Also, it would have been obvious to apply the power saving method to the encoder as done to decoder by dynamically varying supply voltage and frequency and substrate bias of encoder, in order to suppress power consumption of encoder at minimum in the range that the proper speed is met.

Therefore, given this teaching, it would have been obvious to the ordinary person in the art to modify Choi and Miyazaki by providing specifically video encoder predicting skipped macroblocks prior to encoding and then avoiding encoding operation the skipped macroblock by interruption at the time of encoding skipped macroblock as taught by Zhao, and incorporating the Miyazaki frequency/supply voltage/substrate bias table and substrate bias voltage control circuit to the encoder, in order to save computation to avoid the failure and suppress power consumption of encoder at

minimum in the range that the proper speed is met. the Choi Frame-Based Dynamic Voltage and Frequency Scaling for a MPEG Decoder, incorporating the Miyazaki frequency/supply voltage/substrate bias table and substrate bias voltage control circuit, further incorporating the Zhao video encoder predicting skipped macroblocks prior to encoding and then avoiding encoding operation the skipped macroblock by interruption at the time of encoding skipped macroblock as taught by Zhao, further incorporating the Miyazaki frequency/supply voltage/substrate bias table and substrate bias voltage control circuit to the encoder, has all the features of claim 9.

Regarding **claim 22**, the claimed invention is a method claim corresponding to the system claim 9. Therefore, it is rejected for the same reason as claim 9.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HEE-YONG KIM whose telephone number is (571)270-3669. The examiner can normally be reached on Monday-Thursday, 8:00am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha Banks-Harold can be reached on (571)273-8300. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/HEE-YONG KIM/
Examiner, Art Unit 2621

/Andy S. Rao/
Primary Examiner, Art Unit 2621
August 26, 2010